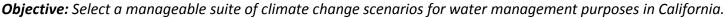
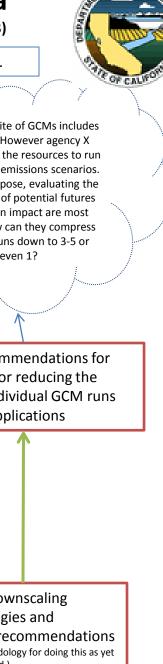
## Scenario Selection for Water Management in California

California Department of Water Resources - Climate Change Technical Advisory Group (Revised Draft 8-23-13)





Filter latest suite of GCMs\* for Eg. Step 3 suite of GCMs includes those that do not produce 15 GCMs. However agency X Step 1. reasonable regional climatologies Culled GCMs doesn't have the resources to run and distributions of regional 15 GCMs x 3 emissions scenarios. This will probably be (not used/discarded) For their purpose, evaluating the anomalies for temperature and done using the likely range of potential futures methodology proposed precipitation along the West and median impact are most by Rupp et al. (OCCRI) Coast/California. useful. How can they compress currently in draft. the 15x3 runs down to 3-5 or Needs to be reviewed even 1? by CCTAG/DWR. **Remaining GCMs** Further refine suite of GCMs by Step 2. **Parallel Processes** culling those that exhibit poor Develop recommendations for performance for Temperature, Initiate study to evaluate compressing or reducing the Step 5. Precipitation, and Humidity for GCM performance using number of individual GCM runs a decision support tool to California. (No downscaling) **Culled GCMs** for specific applications compare observed (not used/discarded) historical and simulated A) Develop comparison methodology historical periods for use B) Establish criteria and criteria in future scenario weighting for measuring evaluation activities performance of each GCM Perform GCM Comparisons Initiate separate/parallel process for devising Compile a suite of scenarios and analysis preferred GCMs for Water methodologies for flood Management Analysis protection activities Step 3. **Evaluate downscaling** methodologies and Step 4. formulate recommendations (Process/methodology for doing this as yet to be determined.)

\* Coupled Model Intercomparison Project Phase 5 (CMIP5)

| uniciabilities to Cilliate Cilange | /ulnerabilities to Climate Change |  |  |  |  |
|------------------------------------|-----------------------------------|--|--|--|--|
| Analyses of Primary Importance     |                                   |  |  |  |  |
| urface Water Supply Reliability    |                                   |  |  |  |  |
| Streamflow                         |                                   |  |  |  |  |
| Surface Water Deliveries           |                                   |  |  |  |  |
| Carryover Storage                  |                                   |  |  |  |  |
| Runoff Timing                      |                                   |  |  |  |  |
| Delta Salinity                     |                                   |  |  |  |  |
| nvironmental Flows                 |                                   |  |  |  |  |
| Streamflow                         |                                   |  |  |  |  |
| Reservoir temperature              |                                   |  |  |  |  |
| Carryover storage                  |                                   |  |  |  |  |
| Air temp                           |                                   |  |  |  |  |
| roundwater Conditions              |                                   |  |  |  |  |
| ydropower                          |                                   |  |  |  |  |
| Streamflow                         |                                   |  |  |  |  |
| Carryover storage                  |                                   |  |  |  |  |
| /ater Demand (Ag and Urban)        |                                   |  |  |  |  |
| ood Risk                           |                                   |  |  |  |  |
| Precip intensity                   |                                   |  |  |  |  |
| Precip duration                    |                                   |  |  |  |  |
| Antecident soil moisture           |                                   |  |  |  |  |
| Antecident snow conditions         |                                   |  |  |  |  |
| Maximum flows (3, 7, 10 day)       |                                   |  |  |  |  |
| Analyses of Secondary Importance   | e                                 |  |  |  |  |
| /ildfire                           |                                   |  |  |  |  |
| gricultural Productivity           |                                   |  |  |  |  |
| Others                             |                                   |  |  |  |  |

|       | er Management Analyses with erabilities to Climate Change |
|-------|---|
|       | Analyses of Primary Importance                            |
| Surfa | ce Water Supply Reliability                               |
| Stre  | amflow  |
| Surf  | ace Water Deliveries                                      |
| Carr  | yover Storage   |
| Run   | off Timing  |
| Delt  | a Salinity  |
| F     | anno antal Elanca   |
|       | onmental Flows  |
|       | amflow  |
|       | ervoir temperature  |
|       | yover storage   |
| Airt  | emp   |
| Grou  | ndwater Conditions  |
|       |   |
|       | opower  |
| Stre  | amflow  |
| Carr  | yover storage   |
| Wate  | er Demand (Ag and Urban)                                  |
|       |   |
|       | Analyses of Secondary Importance                          |
| Wild  | fire  |
| Agric | ultural Productivity                                      |
|       |   |
|       | Others  |

**Ecosystem Services** 



| Water Management Analyses with  /ulnerabilities to Climate Change | Model                |  |  |
|---|----------------------|--|--|
| Analyses of Primary Import  |                      |  |  |
| Surface Water Supply Reliability                                  |                      |  |  |
| Streamflow  | Rainfall-runoff      |  |  |
| Surface Water Deliveries  | Operations           |  |  |
| Carryover Storage   | Operations           |  |  |
| Runoff Timing   | Rainfall-runoff      |  |  |
| Delta Salinity  | ANN+Operations       |  |  |
| Environmental Flows   |                      |  |  |
| Streamflow  | Rainfall-runoff      |  |  |
| Reservoir temperature   | Rainfall-runoff+ Res |  |  |
| Carryover storage   | Operations           |  |  |
| Air temp  | GCM                  |  |  |
| Groundwater Conditions  | Groundwater model    |  |  |
| Hydropower  |                      |  |  |
| Streamflow  | Rainfall-runoff      |  |  |
| Carryover storage   | Operations           |  |  |
| Water Demand (Ag and Urban)                                       | Land Use Model       |  |  |
| Analyses of Secondary Impo  | rtanco               |  |  |
| Wildfire  | Wildfire model       |  |  |
|   |                      |  |  |
| Agricultural Productivity   | Ag Productivity      |  |  |
| Others  |                      |  |  |
| Ecosystem Services Multiple                                       |                      |  |  |

| Water Management Analyses with    |                         |   |
|-----------------------------------|-------------------------|---|
| Vulnerabilities to Climate Change | Model                   | <b>Key GCM Output Needed</b>  |
| Analyse                           | s of Primary Importance |   |
| Surface Water Supply Reliability  |                         |   |
| Streamflow                        | Rainfall-runoff         | Downscaled T, P, H  |
| Surface Water Deliveries          | Operations              | Downscaled T, P, H via R-R  |
| Carryover Storage                 | Operations              | Downscaled T, P, H via R-R  |
| Runoff Timing                     | Rainfall-runoff         | Downscaled T, P, H  |
| Delta Salinity                    | ANN+Operations          | Downscaled T, P, H via R-R + SLR  |
| Environmental Flows               |                         |   |
| Streamflow                        | Rainfall-runoff         | Downscaled T, P, H  |
| Reservoir temperature             | Rainfall-runoff+ Res    | Downscaled T, P, H  |
| Carryover storage                 | Operations              | Downscaled T, P, H via R-R  |
| Air temp                          | GCM                     | Downscaled T  |
| Groundwater Conditions            | Groundwater model       | Downscaled T, P, H, Runoff  |
| Hydropower                        |                         |   |
| Streamflow                        | Rainfall-runoff         | Downscaled T, P, H  |
| Carryover storage                 | Operations              | Downscaled T, P, H via R-R  |
| Water Demand (Ag and Urban)       | Land Use Model          | Downscaled T, P, H  |
| Analyses                          | of Secondary Importance |   |
| Wildfire                          | Wildfire model          | Downscaled T, P, H, W <sub>s</sub> , etc.                                     |
| Agricultural Productivity         | Ag Productivity         | Downscaled T <sub>ave</sub> , T <sub>max</sub> , T <sub>min</sub> , P, H, etc |
|                                   | Others                  |   |
| Ecosystem Services                | Multiple                | Varies  |



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